TABLE 1.—*Free-air temperatures, relative humidities and vapor pressures during January, 1922.*

TEMPERATURE (°C).

Altitude. M. S. L. (m).	Broken Arrow, Okla. (233m.).		Drexel, Nebr. (396m.).		Due West, S. C. (217m.).		Ellendale, N. Dak. (444m.).		Groesbeck, Tex. (141m.).		Royal Center, Ind. (225m.).	
	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.
Surface	2.2	— 2.1	— 7.1	— 1.1	6.3	.....	—12.2	— 2.3	5.6	— 3.2	— 5.8	— 2.7
250	2.2	— 2.1	.....	.....	6.1	.....	.....	.....	5.2	— 3.2	— 5.8	— 2.6
500	1.5	— 2.3	— 7.3	— 1.2	4.6	.....	—11.9	— 2.0	4.5	— 2.9	— 6.2	— 1.9
750	0.9	— 2.7	— 6.8	— 0.9	4.1	.....	—10.4	— 0.8	4.9	— 2.2	— 6.2	— 1.5
1,000	0.7	— 3.0	— 6.3	— 1.4	3.6	.....	— 9.1	— 1.0	6.4	— 0.7	— 6.5	— 1.8
1,250	0.8	— 2.9	— 5.9	— 1.6	3.0	.....	— 8.5	— 1.3	7.1	+ 0.5	— 6.6	— 1.8
1,500	0.7	— 2.5	— 6.0	— 1.7	2.3	.....	— 8.9	— 1.6	7.0	+ 1.2	— 7.0	— 2.0
2,000	— 0.2	— 1.8	— 7.6	— 2.3	0.7	.....	—10.6	— 1.5	5.5	+ 1.3	— 7.4	— 1.7
2,500	— 2.1	— 2.1	— 9.7	— 2.4	— 1.1	.....	—12.3	— 1.0	2.8	+ 0.8	— 9.6	— 2.6
3,000	— 4.4	— 1.8	—11.6	— 1.9	— 3.1	.....	—15.1	— 1.1	0.5	+ 0.8	—11.6	— 2.3
3,500	— 6.5	— 1.7	—14.6	— 2.6	— 5.1	.....	—18.2	— 1.4	— 1.9	+ 1.0	—13.8	— 2.1
4,000	— 9.0	— 2.9	—17.9	— 3.3	— 7.3	.....	.....	.....	— 4.3	+ 1.4	.....	.....
4,500	—12.1	.....	—21.7	— 4.3	—10.1	.....	.....	.....	— 7.9	+ 0.4	.....	.....
5,000	—15.1	.....	—24.7	.....	—12.6	.....	.....	.....	—11.9	— 0.2	.....	.....

RELATIVE HUMIDITY (%).

Altitude. M. S. L. (m).	Broken Arrow, Okla. (233m.).		Drexel, Nebr. (396m.).		Due West, S. C. (217m.).		Ellendale, N. Dak. (444m.).		Groesbeck, Tex. (141m.).		Royal Center, Ind. (225m.).	
	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.
Surface	72	—3	82	0	68	.....	86	+7	78	—1	70	—10
250	72	—2	.....	.....	68	.....	.....	.....	77	0	70	—9
500	68	+2	81	+2	67	.....	84	+6	75	0	61	—14
750	64	+4	76	+3	65	.....	76	+4	73	+3	57	—13
1,000	59	+5	73	+6	65	.....	70	+6	67	+5	55	—9
1,250	54	+4	69	+8	65	.....	65	+6	61	+4	52	—6
1,500	50	+3	64	+6	67	.....	63	+6	58	+5	50	—3

RELATIVE HUMIDITY (%)—Continued.

Altitude. M. S. L. (m).	Broken Arrow, Okla. (233m.).		Drexel, Nebr. (396m.).		Due West, S. C. (217m.).		Ellendale, N. Dak. (444m.).		Groesbeck, Tex. (141m.).		Royal Center, Ind. (225m.).	
	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.
2,000	46	+4	60	+4	62	.....	57	0	55	+9	42	—5
2,500	42	0	58	+3	64	.....	53	—4	58	+16	45	0
3,000	34	—11	57	+1	62	.....	53	—4	56	+17	46	—2
3,500	32	—22	60	+6	61	.....	54	—3	51	+13	43	—10
4,000	30	—11	66	+14	59	.....	.....	.....	44	+8	.....	.....
4,500	30	.....	69	+16	59	.....	.....	.....	43	+9	.....	.....
5,000	30	.....	68	.....	60	.....	.....	.....	42	.....	.....	.....

VAPOR PRESSURE (*mb.*).

Altitude. M. S. L. (m).	Broken Arrow, Okla. (233m.).		Drexel, Nebr. (396m.).		Due West, S. C. (217m.).		Ellendale, N. Dak. (444m.).		Groesbeck, Tex. (141m.).		Royal Center, Ind. (225m.).	
	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.
Surface	5.53	—1.08	2.93	—0.51	7.25	.....	2.23	—0.31	7.65	—1.89	2.91	—1.38
250	5.51	—1.03	.....	.....	7.12	.....	.....	.....	7.38	—1.59	2.85	—1.31
500	5.01	—0.60	2.82	—0.44	6.34	.....	2.20	—0.30	6.81	—1.45	2.55	—1.11
750	4.54	—0.45	2.77	—0.13	6.16	.....	2.14	—0.15	6.75	—0.73	2.39	—0.93
1,000	4.04	—0.39	2.74	0.00	5.96	.....	2.09	—0.13	6.69	+0.21	2.23	—0.67
1,250	3.65	—0.38	2.63	+0.06	5.50	.....	1.97	—0.20	6.36	+0.66	2.10	—0.57
1,500	3.26	—0.36	2.44	+0.01	5.18	.....	1.85	—0.18	6.04	+1.05	1.98	—0.39
2,000	2.75	—0.14	2.02	—0.14	4.45	.....	1.52	—0.27	5.17	+1.29	1.64	—0.31
2,500	2.23	—0.59	1.64	—0.21	4.03	.....	1.29	—0.14	4.61	+1.55	1.53	—0.14
3,000	1.61	—0.99	1.39	—0.18	3.48	.....	1.07	—0.02	3.78	+1.30	1.28	—0.24
3,500	1.42	—1.19	1.19	—0.11	3.04	.....	0.97	+0.15	3.01	+0.91	1.07	—0.20
4,000	1.28	—0.65	1.01	—0.04	2.74	.....	.....	.....	2.32	+0.56	.....	.....
4,500	1.18	.....	0.64	—0.29	2.59	.....	.....	.....	2.09	+0.43	.....	.....
5,000	1.10	.....	0.31	.....	2.48	.....	.....	.....	1.88	.....	.....	.....

TABLE 2.—*Free-air resultant winds (m. p. s.) during January, 1922.*

Altitude. M. S. L. (m.)	Broken Arrow, Okla. (233m.)				Drexel, Nebr. (396m.)				Due West, S. C. (217m.)		Ellendale, N. Dak. (444m.)				Groesbeck, Tex. (141m.)				Royal Center, Ind. (225m.)			
	Mean.		Normal.		Mean.		Normal.		Mean.		Mean.		Normal.		Mean.		Normal.		Mean.		Normal.	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	N.88° W.	0.3	S.33° W.	0.8	S.59° W.	0.9	N.82° W.	1.6	N. 17° W.	0.5	N. 80° W.	2.7	N. 54° W.	3.3	N. 22° E.	2.3	N. 30° W.	0.9	S. 57° W.	1.7	S. 50° W.	2.3
250	S. 50° W.	0.4	S. 30° W.	1.2	.....	.....	.....	.....	N. 34° W.	0.7	.....	.....	.....	.....	N. 24° E.	3.0	N. 41° W.	0.9	S. 69° W.	2.1	S. 46° W.	2.8
500	S. 16° E.	2.1	S. 34° W.	2.2	S. 55° W.	1.7	N. 76° W.	2.7	N. 73° W.	1.6	N. 87° W.	3.0	N. 55° W.	3.9	N. 30° E.	3.0	S. 83° W.	1.4	S. 52° W.	3.4	S. 60° W.	5.0
750	S. 8° E.	2.9	S. 36° W.	3.3	S. 73° W.	3.5	N. 69° W.	4.6	W.	3.0	N. 87° W.	4.1	N. 59° W.	6.1	N. 33° E.	2.0	S. 75° W.	2.6	S. 65° W.	4.4	S. 67° W.	7.3
1,000	S.	3.5	S. 57° W.	3.8	S. 75° W.	4.0	N. 71° W.	5.8	S. 87° W.	3.7	N. 76° W.	4.8	N. 59° W.	11.0	N. 16° E.	0.6	S. 74° W.	3.4	S. 87° W.	6.5	S. 73° W.	7.8
1,250	S. 19° W.	3.6	S. 70° W.	4.0	S. 79° W.	6.1	N. 70° W.	7.0	S. 77° W.	6.0	N. 75° W.	6.1	N. 62° W.	8.6	N. 83° W.	2.0	S. 80° W.	4.4	N. 86° W.	7.8	S. 77° W.	9.3
1,500	S. 31° W.	3.6	S. 57° W.	6.3	S. 83° W.	7.2	N. 69° W.	8.2	S. 82° W.	6.9	N. 81° W.	5.9	N. 59° W.	9.1	S. 80° W.	3.6	S. 88° W.	5.6	N. 75° W.	9.7	S. 80° W.	10.4
2,000	S. 64° W.	5.2	S. 66° W.	9.1	S. 88° W.	8.9	N. 70° W.	10.6	N. 89° W.	8.5	N. 79° W.	7.7	N. 62° W.	11.2	S. 74° W.	8.1	S. 88° W.	6.5	N. 79° W.	10.8	S. 82° W.	12.4
2,500	S. 74° W.	7.4	S. 83° W.	9.8	N. 88° W.	11.1	N. 78° W.	12.6	N. 80° W.	12.1	N. 76° W.	9.9	N. 62° W.	13.2	S. 66° W.	11.6	W.	7.4	S. 87° W.	13.4	W.	14.3
3,000	S. 78° W.	10.1	N. 80° W.	12.3	S. 89° W.	13.1	N. 76° W.	14.4	N. 78° W.	17.1	N. 74° W.	13.3	N. 65° W.	14.6	S. 66° W.	13.9	N. 89° W.	9.0	S. 86° W.	12.5	N. 88° W.	14.3
3,500	S. 87° W.	9.9	N. 71° W.	14.0	N. 79° W.	14.5	N. 77° W.	15.5	N. 83° W.	17.3	N. 74° W.	12.3	N. 65° W.	16.2	S. 72° W.	13.2	N. 78° W.	11.0	N. 74° W.	16.6	S. 71° W.	12.8
4,000	S. 68° W.	15.0	N. 68° W.	19.3	N. 86° W.	16.7	N. 84° W.	17.2	N. 69° W.	16.9	N. 54° W.	17.6	N. 59° W.	17.8	S. 46° W.	16.7	N. 63° W.	11.8	.....	.....	S. 63° W.	17.3
4,500	S. 68° W.	16.3	.....	.....	N. 56° W.	12.9	N. 84° W.	18.8	N. 45° W.	17.6	.....	.....	N. 49° W.	19.1	S. 54° W.	18.5	N. 44° W.	9.2	.....	.....	.....	.....
5,000	W.	17.6	.....	.....	W.	15.0	W.	18.9	N. 45° W.	17.8	.....	.....	N. 76° W.	17.3	S. 68° W.	21.6	W.	13.0	.....	.....	.....	.....

THE WEATHER ELEMENTS.

By P. C. DAY, Climatologist and Chief of Division.

(Weather Bureau, Washington, D. C.)

PRESSURE AND WINDS.

Probably the most important feature of the atmospheric pressure distribution for the month was the persistence and strength of the Plateau high area. Save for a few days at the beginning of the month, a short period slightly after the middle, and again toward the end, the pressure over this region was continually high. At Baker City, Oreg., the sea-level pressure on the 11th, 31.02 inches, was the highest ever observed at that station.

For the month as a whole pressure was above normal over all portions of the United States, save in a small section of the far Southwest, where there was a slight deficiency. In the Canadian Provinces average pressures were likewise above normal over the central and eastern districts, but over the western Provinces there was a tendency toward slight deficiencies.

Compared with the previous month, pressure was higher in all districts, save in the Rocky Mountains and portions of the adjacent Great Plains.

From the middle and upper Mississippi Valley eastward the increases over the preceding month were important, ranging from 0.10 to 0.20 inch. In other districts the variations were distinctly less.

In the Plateau districts there was a general movement of the winds at the lower levels outward in all directions from the region of highest pressure, over southern Idaho and portions of adjacent States. In other districts wind directions varied greatly. Over the Atlantic and Gulf States and in portions of the Ohio Valley the winds were mainly from north or northeast points. In the middle Plains and portions of the Lake region they were largely from the south; elsewhere variable.

High winds over extensive areas were confined mainly to a few periods; over the Great Lakes and portions of adjacent territory they occurred on the 4th and 5th; over the Atlantic Coast States they occurred mainly on the 11th and 12th, reaching a velocity of 74 miles an hour at Eastport, Me., and Atlantic City, N. J.; and again on the 22d in the Lake region, reaching a velocity of 76 miles per hour at Buffalo, N. Y.

TEMPERATURE.

The persistent cold over the Plateau region and the adjacent portions of the Pacific Coast States was the most important feature of the temperature distribution during the month. In the central portion of this region the daily temperatures were below normal throughout the entire month, save for a day or two, and the minimum temperatures, and monthly means as well, were the lowest of record for January. Frosts were frequent in central and southern California and the adjacent portions of Arizona, attaining their maximum severity at the beginning of the third decade, when much damage to citrus fruits and winter gardens was reported.

In the districts from the Rocky Mountains eastward there were frequent and important changes in temperature, but no unusual extremes were observed. The principal periods of cold were as follows: Over the Gulf States on the 2d; in the southern Appalachian Mountains and Middle Atlantic States on 13th and 14th; over Texas and the Southwest on the 19th to 21st; from the middle Mississippi Valley northeastward to New England on the 23d to 26th; and in the Middle Plains region on the 30th.

Minimum temperatures below freezing were observed in some portion of all the States, and temperatures below zero occurred as far south as North Carolina, Tennessee, Oklahoma, northern Texas, and thence westward. The lowest reported, −54°, occurred in northern Wisconsin, and temperatures of −50° or lower were reported also from northern Minnesota and the mountain regions of Idaho and Wyoming.

The highest temperatures of the month were observed in the central valleys and most northern and eastern districts during the first few days, over the Pacific Coast States about the 10th to 14th, and in the Gulf and South Atlantic States about the 19th to 21st.

For the month as a whole, temperatures were below normal in all districts west of the Rocky Mountains, the deficiencies ranging from eight to fourteen degrees in the central Plateau. Monthly averages were also below normal by small amounts from Texas northeastward to the Ohio Valley and over much of the Atlantic coast area.

Mean temperatures for the month were slightly above normal in the Middle Gulf States and Tennessee Valley, from the Middle Plains northward, and generally over Canada, the month being distinctly warm on the average in the Canadian Northwest.

PRECIPITATION.

The principal periods when precipitation was general and of importance over large areas were as follows: From the 2d to 5th, during which time a storm of wide extent moved from the far Southwest to New England. Heavy rains from this storm prevailed over southern California and portions of Arizona, turning into snow at the higher elevations of the southern Mountain districts. It was attended by light rains or snows in the Great Plains, and by moderate to heavy rains or snows in the central valleys and eastern districts. On the 10th to 12th precipitation was general over Texas and other portions of the Southwest, and generally from the Mississippi River to the Atlantic coast. Heavy rains occurred over the Gulf and South Atlantic States, and heavy rains near the coast and heavy snows further inland to the northward. From the 26th to 29th, a storm of considerable importance moved from southern Florida northeastward slightly off the Atlantic coast line, giving moderate rains in the southern areas, sleet in portions of Georgia and South Carolina and heavy snow from North Carolina to the eastern portions of Pennsylvania, New York, and southern New England.

The total precipitation for the month was generous over the Gulf and Atlantic Coast States, and in the Ohio and lower Mississippi Valleys, although in the last-named districts the monthly amounts were less than normal. The precipitation was usually light over the northern districts east of the Rocky Mountains, and over the Pacific coast and northern Plateau States there was a well marked deficiency. In southern California the precipitation was unusually heavy, occurring mainly near the beginning and end of the month.

SNOWFALL.

The area over which measurable snow occurred embraced the greater part of the country, and the total fall for the month was equal to or in excess of the average over many sections.

The snow over the Middle Atlantic States during the 27th to 29th was in many sections the heaviest single fall of record, this being particularly true from central North Carolina northeastward through the central portions of Virginia and Maryland to southeastern Pennsylvania where the unmelted depths ranged from 15 to 30 inches or more. A full account of this unusual snowfall appears in another portion of this REVIEW. (See pp. — to —.)

In the western Mountain regions snowfall was deficient in the Sierra Nevada, and generally over Arizona and New Mexico, but in other portions the amounts were usually near the normal fall, and the outlook was favorable for a plentiful supply of water for irrigation and other purposes.

RELATIVE HUMIDITY.

The distribution of moisture in the atmosphere as indicated by the average relative humidity presented no unusual features.

In general the departures from normal coincided with the distribution of precipitation. In the South Atlantic and Gulf States the relative humidity was usually above normal, although there were some well marked exceptions. Likewise in much of the Great Plains, Rocky Mountains, and Plateau regions there was a general excess. Over the remaining districts the average relative humidity was less than normal, the negative departures being well pronounced over limited areas in the upper Mississippi Valley, the Great Lakes region, and eastward.

The deficiency over the Pacific Coast States was likewise pronounced in several instances.